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TECHNICAL NOTES
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ALASKA FOREST RESEARCH CENTER
U. S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE

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ESTIMATING SITE INDEX IN SAPLING AND POLE STANDS IN SOUTHEAST ALASKA

Conventional height-over-age curves are seldom useful for estimating site index of young stands. In Southeast Alaska, their use is limited to stands of about 30 to 40 years and older. The principal reason for this is that a range of several years always exists between the ages of dominant and codominant trees, and errors of five years or more in estimating stand age are not uncommon. Miscalculating stand age by five years in a 20-year-old stand could throw site index estimation off by more than 20 site index units. This and other reasons 1/, both theoretical and practical, have led to testing of other methods for estimating site in young stands.

A reasonably reliable method of predicting the site index that will be attained by young stands of Douglas-fir was reported by Warrack and Fraser. 2/ In older stands they were able to relate internodal span, which is easily measured in young stands, to site index as determined from average total height. An attempt to establish a similar relationship for western hemlock-Sitka spruce stands in Southeast Alaska is described below.

Internodal span and site index were measured in 33 young-growth plots over 30 years old. Six-node span, beginning with the first node above breast height, was measured on six dominant and codominant spruce on each plot. Plot site index was based on the average height of six dominant and codominant spruce and western hemlock. 3/

Tree-to-tree variation of internodal span was determined for each plot in terms of one standard deviation. Two plots, having standard deviations exceeding twice the average, were rejected. The large deviations were believed due to within-plot site variation.

Site index, when plotted graphically over 6-node span, indicated a linear relationship. The regression (fig. 1) fitted by least squares, had a standard error of estimate of 15.4 site index units.

1/ Wakeley, P.C. and Marrero, J. Five-year intercept as site index in southern pine plantations. Jour. Forestry 56(5):332-336. 1958.

2/ Warrack, G.C. and A.R. Fraser. Estimation of site quality in juvenile Douglas-fir stands. B. C. For. Serv. Res. Note 28. 1955.

3/ Site index curves are published in: Taylor, R. F. Yield of second-growth western hemlock-Sitka spruce stands in Southeastern Alaska. U.S.D.A. Tech. Bul. No. 412. 29 pp. 1934.

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A highly significant relationship was found between site index and 6-node span. The coefficient of variation squared was 0.63, indicating that 63 percent of the variation was accounted for by the regression. Confidence limits around the regression in terms of sampling error at the 95 percent level of probability are shown in figure 1. Sampling error is smallest around mid-range of the data. When 6-node span averages eight feet, sampling error around the regression line is only $\pm$ 5.7 site index units as compared with $\pm$ 12 or more site index units at the tails of the curve.

The error of 6-node span measurements is too large for precise estimates of site index. The method is useful, however, for rough approximations. At present it is the only way to estimate site index in young stands in this region.

The user should be thoroughly aware of the limitations of the method and should avoid practices which would result in even larger errors. Trees with growth limited by suppression should not be used in measuring 6-node span. It is recommended that a minimum of six trees be measured on each plot or area. If less than six trees are measured the sampling error can be expected to exceed that shown by the confidence limits plotted in figure 1.

May 1960

Robert A. Gregory

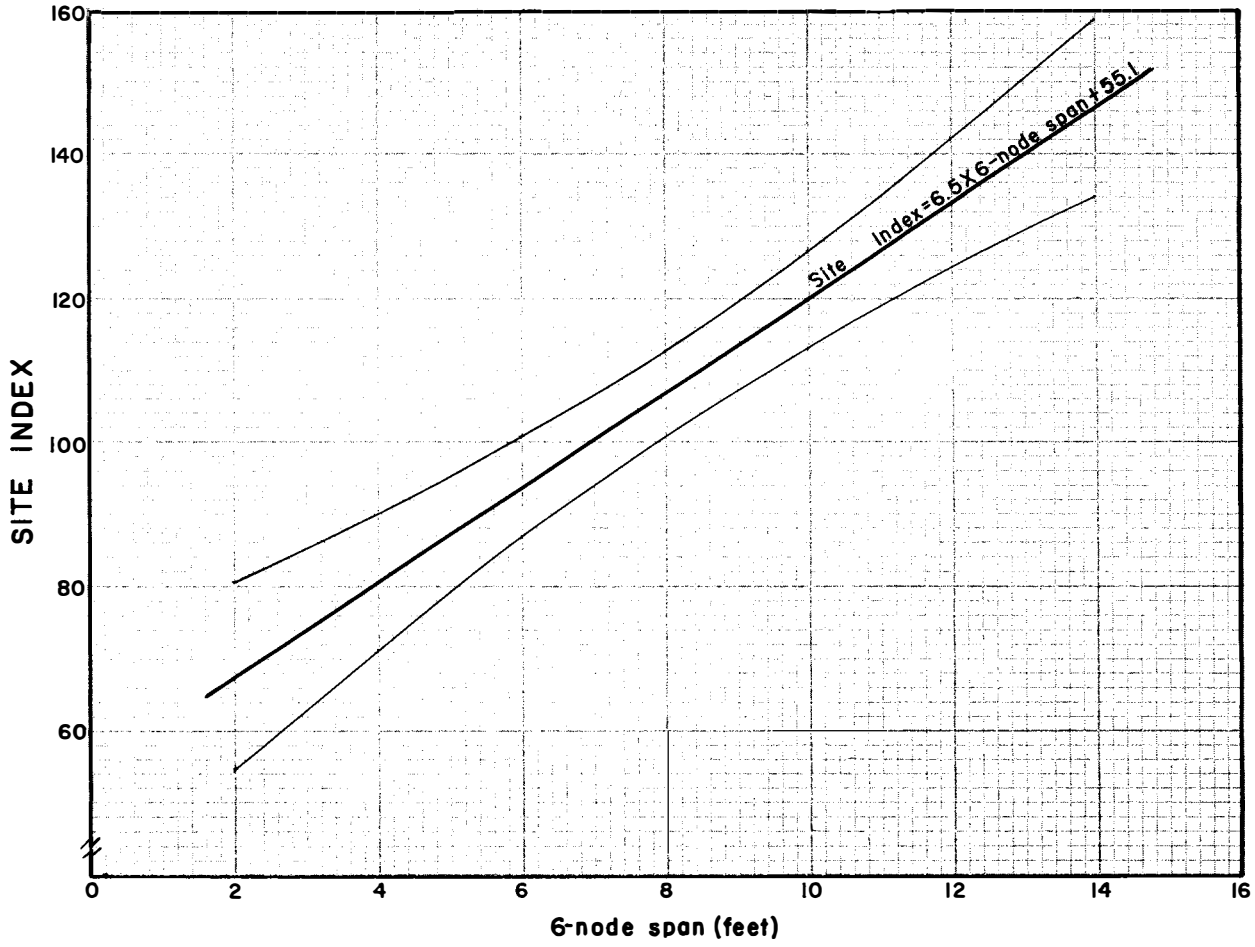

Figure 1.--Graph for estimating site index from measurements of 6-node span, with confidence limits for the 95 percent level of probability.

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